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FRANKFORT

URBAN FORESTRY MANAGEMENT PLAN

APRIL 2001

A REPORT SUBMITTED TO THE FRANKFORT CITY COMMISSION
BY
THE FRANKFORT URBAN FORESTRY ADVISORY BOARD
AND
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URBAN FORESTRY MANAGEMENT PLAN

EXECUTIVE SUMMARY

The Urban Forestry Management Plan is submitted in accordance with the City Ordinance No.8, 1997 Series, which requires among other provisions that a plan be developed to “protect, improve, and preserve” the City’s urban forest.

The Plan describes the natural resource conditions of the City, makes a preliminary assessment of the urban forests in our community, and sets forth a budget, policies, and programs to begin implementation of an Urban Forestry Program. Without a commitment of financial resources and staff, the Ordinance’s goals can not be achieved.

This report contains 6 primary implementation strategies which for Frankfort’s Urban Forestry Program.

- I DEVELOP AND FUND AN URBAN FORESTRY PROGRAM**
- II. CARRY OUT AN INVENTORY OF ALL CITY TREES ON CITY PROPERTY OR RIGHTS OF WAY**
- III. DEVELOP AND FUND A TREE MAINTENANCE PROGRAM**
- IV. DEVELOP AND FUND A TREE PLANTING PROGRAM**
- V. ESTABLISH A PUBLIC INFORMATION / EDUCATION / VOLUNTEER PROGRAM**
- VI. IMPROVE AND ENFORCE ORDINANCES AND POLICIES**

The Frankfort Urban Forestry Advisory Board believes with a modest infusion of dollars, revision of some policies, and implementation of new programs, an Urban Forestry Program can be developed to meet the goals of the Ordinance. The benefits of the program will offset the City’s investment.

The Program will supplement the present city staff capacity to manage the community’s trees on public property. State and federal funding assistance will be sought when available. For example, the addition of new computer hardware and Geographic Information System software (acquired under a federal/state program and matched with City funds) will be a valuable tool for City staff to geographically map our resources.

The Urban Forestry Program will increase community pride, address the growing problem of potential accidents from hazard trees, positively impact the community’s drainage capacity and flood mitigation activities, and provide many other civic, economic, and environmental benefits.

GOALS AND OBJECTIVES OF THE URBAN FORESTRY MANAGEMENT PLAN

The goal of this management plan is to protect, improve, and preserve the urban forest of the City and to achieve the objectives of ensuring an urban forest that is safe, healthy, pleasing to the senses, and functional. Such an urban forest would enhance and facilitate the activities of the City as well as provide a place where our citizens can delight and learn, and a place where our cultural and biological amenities are preserved. Additional objectives are to promote public participation, improve coordination among agencies impacting the urban forest, and enhance the effectiveness of ordinances and policies. This plan is designed to enable the City to achieve these objectives through recommended policies, programs, funding, and public education.

GENERAL OVERVIEW

An urban forest consists of all trees, shrubs, and vegetation found in a city. Operation of the urban forest system involves interactions among vegetation, soils, water, topography, insects, wildlife, climate, man-made surfaces and processes, and people. An urban forest provides tangible values to the urban environment and economy including temperature moderation, flooding and run-off control, water conservation, noise insulation, visual buffering, improved air quality, and recreation. In addition, intangible benefits are provided in the form of beauty, serenity, and community pride which all serve to define quality of life.

While an urban forest provides numerous aesthetic and economic benefits (Appendix A), it can impose dramatic costs upon a community if it is not properly managed. These costs are most obvious when poorly maintained trees wreak havoc on a community and its infrastructure in the aftermath of a storm, or when a "hazard tree" causes injury to a citizen or property. The costs can also be seen, however, when poor maintenance, location, and species selection lead to accelerated decline and replacement of trees, loss of natural storm water retention and storage capacity, and increased heating and cooling expenditures (Appendix B). This Urban Forestry Management Plan is needed to ensure Frankfort receives the benefits provided by a healthy urban forest.

Frankfort's Urban Forest Environment

Frankfort was founded along the Kentucky River and incorporated in 1786, making it one of the oldest cities in the state. Much of the travel to Frankfort in the early days was by river and early development began in the river valley. Now, the City has expanded rapidly outside the older downtown area and covers 9,540 acres (15 square miles) with a population of around 25,000 (1994 Comprehensive Plan).

The topography of Frankfort includes a narrow river basin surrounded by steep to rolling hills. Soils on these hills generally are not deep (mostly less than 3 ft.), especially on the slopes, and a hard pan or clay layer often restricts ground seepage; therefore storm runoff can be intense in these areas. Alluvial soils predominate in the river valley. As is typical of regions underlain with limestone, sinkholes and caves occur throughout much of the area.

One of Frankfort's continuing challenges is related to storm drainage and flooding. The downtown area of Frankfort is at the downstream end of 5,412 square miles of the Kentucky River watershed. This factor has a major influence on hydrologic conditions. Although early drainage problems were more directly related to flooding from the Kentucky River, many flooding issues today relate to surface water runoff and diminished drainage capacity. The forested river valley and woodlands retained and slowed runoff prior to development to a point that the river generally remained within its banks. As more of the watershed is overlaid with impervious coverings such as asphalt and concrete, less surface water is absorbed. The increased runoff also flows at a more rapid rate and the excess water in turn increases flooding. The natural drainage capacity is continually being reduced, making it imperative for the City to improve and manage its natural drainage areas. An active urban forestry management plan can improve the absorption of surface water in planned floodways, floodplains, and water retention areas.

History of Urban Forestry in Frankfort

Although there have been various tree planting and maintenance efforts in Frankfort over the years, for decades Frankfort has had no systematic tree planting or maintenance program. As a result, our City forest is in substantial decline and there is a critical need for a vigorous urban forestry program. The Kentucky Division of Forestry has worked with the City and encouraged the adoption of an urban forestry program for a number of years. But it was an episode of clear-cutting trees on the beautiful Kentucky River palisades that surround the downtown that raised citizen awareness and galvanized action. Following this event, the Mayor, members of the City Commission, and a number of citizens, with the help of grants from the Kentucky Division of Forestry, began the process of developing an urban forestry program. An ordinance was adopted in early 1997, and this draft of the Urban Forestry Management Plan is required by the ordinance and deemed necessary for the improved management of our forest resource. The Plan sets out goals and objectives, gives the results of a limited inventory, and contains numerous recommendations for improving Frankfort's urban forest.

The City of Frankfort contracted with Dave Leonard, Consulting Arborist to conduct an inventory and a comprehensive review and analysis of Frankfort's existing tree-related policies, programs and management and to prepare a comprehensive Urban Forestry Management Plan for the City. This work was performed from November, 1997 through November, 1998 as a cooperative effort between Dave Leonard and the Frankfort Urban Forestry Advisory Board (FUFAB), with the assistance of several City personnel. The present draft plan represents an update of that work. The update was carried out by the FUFAB.

INVENTORY OF FRANKFORT'S URBAN FOREST

FRANKFORT'S URBAN FOREST COVER

Frankfort's forest cover was generally categorized using satellite imagery. A photograph was digitized to produce a forest cover map and to make generic calculations of acreages within four cover category (Appendix C). The resulting map shows 8.5% of the City falls in the category of continuous forest (40% or greater canopy cover). Older neighborhoods with 20% to 40% canopy cover compose 10.3%. Another 38.4% of the land within the City is rated under-forested with only 5-20% cover and 40.8% of the land has no significant forest cover. This substantial lack of cover negatively impacts the city.

In addition to the general lack of cover, there are problems across all cover categories. The neighborhoods with mature forest canopies contain many hazardous and declining trees that will be lost in the near future. These same neighborhoods often lack sufficient planting sites on public property, restricting the City's replanting options. Even woodland areas that constitute the highest cover category, ($\geq 40\%$ cover), are often dominated by small or less desirable trees -- their quality having been reduced by clearing, overgrazing, exotic plant invasion, soil erosion, and illegal dumping. Many of the under-forested neighborhoods have planted fast growing trees that are short-lived. These trees will not contribute cover for very long or create a substantial canopy.

These initial findings point to the need for a management plan and implementation strategies that will enable the City of Frankfort to not only maintain but increase its urban forest for generations to come.

PRELIMINARY INVENTORY RESULTS

A cursory visual inventory of the City trees was performed in the course of developing the management plan. Recommendations specifically addressing the problems identified during the survey are provided in subsequent sections.

The older downtown area of Frankfort has many beautiful and historic trees. Sugar maples and sycamores often line neighborhood streets. Dogwoods are prominent in the spring. Canopy cover and shade are generally good in downtown neighborhoods. Some urban renewal and commercial sites lack mature trees and often lack appropriate planting sites. Forested palisades surround the river valley and the downtown area. Trees and other riparian vegetation generally line the river, but a more complete buffer area around the river is needed. Outside the river valley, subdivisions, shopping centers, and strip development have variable canopy cover, and many are treeless.

Frankfort has several hundred acres of parks and other publicly owned property with varied forest cover. Many areas need planting. Trees along the rights of way throughout the City

define the City's character and beauty. Rights of way are in acute need of street tree planting. A preliminary list of City-owned property on which trees are or could be planted is as follows.

CITY OWNED PROPERTY

<u>Name</u>	<u>Location</u>	<u>Acreage</u>
Juniper Hill Park	North of US 60 & adjacent to US 127/West Frankfort Connector	124.0
East Frankfort Park	Myrtle Avenue off East Main St.	47.5
Capital View Park	North of Hwy. 676/East-West Connector and adjacent to the Kentucky River	150.0
South Frankfort Park	Murray St. off Second St.	3.5
Riverview Park	Wilkinson St. and adjacent to the Kentucky River	30.0
Fort Hill	Wilkinson St. and adjacent to Blanton Acres	124.0
St. Clair Mall	St. Clair St. from Broadway to Main St.	0.25
City Drinking Water Plant	South of Hwy. 676/East-West Connector	
City Wastewater Plant	end of Kentucky Avenue and adjacent to the Kentucky River	35.0
Carpenter Farm	US 127/West Frankfort Connector	117.0
City Hall	315 West Second	
Frankfort's Visitor Center	Capital Ave. and Second St.	
Frankfort Electric and Water Plant Board	Myrtle Avenue	
Thornhill Park		
Frankfort Housing Authority		
Prince Hall		
Hickory Hills		

This list is not complete nor does it reflect the flood-prone properties that the City has acquired under the Federal Community Development Block Grants (CDBG) or the Federal Emergency Management Agency (FEMA) programs. These properties are located in South Frankfort, Bellepoint, and on Taylor Avenue. As flood-prone land, these areas are excellent candidates for reforestation and green space restoration, and landscaping has been carried out on some of these areas.

This list also does not include the miles of rights of way owned by or included in the City that may be suitable for tree planting.

In a partial windshield survey of Frankfort's street trees conducted by the consultant, a range of tree densities was found to be from 86 trees per mile in the downtown area to 0 per mile for many City streets. The consultant estimated an average of 13.6 trees per mile, which is far below the current mean for the United States. Many of the streets have been laid out with a very narrow 18" to 24" right of way planting strip, which is too small to properly support trees. Trees in these small spaces would cause branch interference with traffic and pedestrians, damage to City sidewalks, and liability from hazardous trees. Sites where there is sufficient space to accommodate trees were noted in the survey. More sites should be identified for future planting projects. In general, strips that are 36" or wider can accommodate medium sized trees and strips 60" or wider can accommodate large trees if no other factors are limiting. Utilities are a limiting factor for planting and development of healthy trees in many sites.

Street Trees in the Downtown Area

Many of the older City sidewalks are either contiguous with the street and curb or have a very narrow planting strip (Exhibit A). Years ago, trees were planted despite the narrow strip and many have since died. Many of the remaining trees could be classified as declining or hazardous, due to the limited root zone (Exhibit B) and repeated topping (Exhibit C) for utility line clearance.

On some downtown streets, for example, Bridge and Second Streets, minimal sidewalk cutouts have been used to plant trees (Exhibit D). The few survivors in the cutouts are in poor condition, due to limited root space.

By far, the predominant species in right of way plantings in this area has been sugar maple. A small number of native ash, boxelder, silver maple, and sycamore are included in the older tree population. Callery pears, littleleaf lindens, thornless honeylocust, and crabs have been used in some of the newer plantings.

Older Neighborhoods in or near Downtown

Some of the older neighborhoods in or near downtown have good to fair numbers of mature trees, many of them declining and some potentially hazardous. There are few young trees, and many planting opportunities exist. Planting strips between the street and sidewalk vary or are absent.

In downtown, Clinton, Mero, West Main, and Wilkinson Streets (downtown only) have sidewalks adjacent to the street and some two to three foot planting strips. High and Ann Streets have some three-foot strips. Wapping Street has three to four foot strips. Many other streets in the area have adjacent sidewalks or very narrow strips.

In South Frankfort, Logan and Fourth streets have substantial planting strips, often four to five

feet wide. Paul Sawyer, Third and Hermitage have strips that most often are three feet wide. Some areas of South Frankfort have more narrow strips, or the sidewalk is adjacent to the street. Bellepoint, North Frankfort near downtown, and Holmes Street have no planting strips, with sidewalks that are adjacent to the street or nonexistent.

Subdivision Trees

Over the years, the City's ordinances and policies or lack thereof have influenced the kinds and numbers of trees in the subdivisions. The City's present subdivision regulations (Appendix D) were adopted in 1978. They require that trees and wooded areas be identified in new subdivision plans. These regulations also allow the Planning Commission to list natural features such as trees within the subdivision that it wishes to see preserved. The regulations also require as many trees as can be reasonably utilized in the final development plan to be retained and the grading adjusted to the existing trees where practicable. These provisions are permissive and ineffective.

The City's subdivision regulations (Appendix D) require a tree-planting strip of four feet, but there is no requirement for tree planting. The four-foot planting strip is only required where there is a sidewalk. Up until a few years ago sidewalk waivers were often granted by the Planning and Zoning Board, so many subdivisions had neither sidewalks nor planting strips. Recently, the subdivision regulations were amended to prohibit sidewalk waivers unless approved by the City engineer. The subdivision regulations have not been adopted by the county. A number of subdivisions that have now been annexed by the City, were originally developed while part of the county (and subject to county regulations).

The City's landscape ordinance was adopted in 1988(Appendix E). It requires the planting of street trees where there are subdivision lots requiring sidewalks (Section 7.13). Again, sidewalks were often waived until a few years ago. Regarding the preservation of existing trees, the landscape ordinance simply states (Section 7.10) that existing healthy trees that are to be preserved must be shown on the plan and may be substituted for required trees. This provision does not ensure protection of any existing trees.

The following paragraphs describe tree plantings and/or problems in selected subdivisions.

Silver Lake: At the main entrance to Silver Lake an attempt has been made to save existing trees and to include them in a parkway. Such mature trees that have been growing without restrictions rarely adapt well to a severely reduced root system. When site alterations are severe the trees will continue to live for a few years, then decline at an accelerated pace due to the construction damage. No street trees have been planted in the entire subdivision. Much of the strip adjacent to the street is dedicated to collecting runoff from the street. This strip could have been designed to accommodate street trees that would reduce storm water runoff and contribute to the beauty and value of the homes. The private trees planted include pears, crabapple, river birch, red maple, Norway maple, white pine, and flowering dogwood. Many of these trees are relatively short-lived and will not contribute to the overall appeal of the subdivision for very long. This subdivision could be replanted with street trees that would greatly decrease the storm water

runoff and flooding problems. At the same time, as the trees mature, benefits would also be seen in reduced heating and cooling costs, and increased property value.

Riverbend: The Riverbend subdivision is similar to Silver Lake, and was initiated around 1978. The rights of way within the subdivision lack trees and are used for drainage. This now appears to have been a poor choice due to the density of the housing and the existing topography. The majority of the mature trees left during development is declining due to construction damage and will have to be removed soon. The landscape trees used by homeowners include Bradford pear, pin oak, crabapples, green ash, and river birch. More diversity and longer-lived trees are needed.

Arnold Ridge: The Arnold Ridge subdivision was developed in the 1980-90's . A few original trees survive and there are a fair number of yard trees here. Apparently the subdivision regulations were followed as far as sidewalks and planting strips are concerned. The strips are wide, four to six feet, but there are no trees (with very few exceptions) planted in the strips. There are many planting opportunities here.

Indian Hills: The Indian Hills subdivision was developed between 1950 and 1965. There are no sidewalks and almost no street trees in the subdivision. There are a good number of medium age trees in yards.

A desirable subdivision plan would have wide planting strips to accommodate large canopied trees. The planting strip should have topsoil rather than subsoil left after the site is bulldozed. With adequate protection of root zones during grading, large trees that are left during construction should flourish. Severe grade changes around root zones should be avoided. A plan could be required to preserve either a percentage of trees or crown cover with the preliminary plan required prior to issuing a grading permit. If the City encouraged or mandated that street trees be planted, it would greatly increase the desirability of an area, as well as increase environmental benefits. See Appendix F.

Municipal Trees

City Park trees were inspected. Adequate maintenance on recent plantings, needed pruning and hazard tree management has recently been carried out at Riverview Park, and maintenance of new plantings has been conducted at South Frankfort Park, although mower damage and insufficient watering of new plantings were problems here and elsewhere. Due to the high number of native American elms and the presence of Dutch Elm Disease, the parks are losing mature trees at an alarming rate and a sanitation program for elms is needed (Appendix G). East Frankfort Park has many elms that have recently died and need to be removed. All parks need normal maintenance pruning. Most parks need additional trees, especially in parking lots and high use areas. Grants awarded to the FUFAB and the City have provided plantings in Capital View, South and East Frankfort, and Juniper Hill parks, and additional plantings have been suggested for East Frankfort and Capital View parks. Additional plantings are needed for shade, drainage and erosion control and habitat restoration. Substantial planting and maintenance have been carried out in Riverview Park as a result of a grant and City efforts to develop the park, though additional planting is needed. Watering and long-term maintenance are a concern for

recent plantings. Mulching is badly needed to prevent mower damage and preserve moisture and prevent weeds. More attention is needed to adequately care for the park trees.

The public housing area off Wilkinson was built over 50 years ago and was well planted at that time. Their tree population consists mainly of mature trees in fair condition. There is very little right of way for planting. Some replacement planting should be carried out. There are several medium-aged trees at the Douglas Avenue housing project, but more trees are needed. The City and FFAB have used some grant funds to plant shade trees around the Douglas Avenue project playground.

State-owned Trees

As Frankfort is the state capital many properties and rights of way are under state control. These trees are not included in detail in this plan as they are under separate management. In general, trees on state properties (not state rights of way) are of greater species diversity than City trees and have been maintained fairly well. A number are properly mulched with little evidence of mowing damage. While dead trees have been removed, some declining and hazardous trees still exist and a hazard tree management plan should be adopted by the state.

Private Trees

The majority of the trees in Frankfort that comprise the City landscape has been privately planted or grew voluntarily and have been maintained by homeowners. Species include sugar maple, silver maple, pin and other oaks, sycamore, white pine, Norway spruce, ashes, elms, red maple, lindens, sweetgum, hackberry, boxelder, pears, walnut, dogwood, crabapple, black locust, cherry and honey locust. As these trees represent a large portion of Frankfort's urban forest, a public education campaign is needed explaining the value, benefits, and proper care of trees. This could be implemented by the City, the FUFAB, the Extension Service, and local garden clubs. Frankfort Cemetery, which is managed by a non-profit organization, has significant woodland and some outstanding trees that receive significant public use.

Woodland Trees

Several large tracts of forest still exist within the City boundary in City parks or properties and on state property, but the majority is privately owned. The palisades of the Kentucky are in general too steep or inaccessible to develop and have remained forested. Despite being forested, many of the city tracts have been impacted by clearing, overgrazing by deer, exotic plant invasion, erosion, and dumping. These wooded areas greatly contribute to flood control and storm water runoff control, erosion prevention, air purification and quality of life. More attention to their management would improve recreational access and environmental benefits.

RECOMMENDATIONS FOR PROTECTING AND IMPROVING FRANKFORT'S URBAN FOREST

Based on the inventory, observations, and discussions with City personnel, the following recommendations on implementation strategies are made to improve the City's urban forest.

I. DEVELOP AND FUND AN URBAN FORESTRY PROGRAM

Expand the City Staff to Include Urban Foresters.

The City presently has a part time City Arborist to administer a forestry program and the Urban Forestry Management Plan. A full time urban forester is needed to provide expertise and focus for the Urban Forestry Program. Many cities with 20,000 to 60,000 populations have urban foresters or arborists, e.g. Bowling Green, Owensboro, and Paducah. Beginning salaries typically range from \$20,000 to \$35,000 depending on qualifications.

This position should be aided by an urban forester technician position, as needed. Both of these people should have college degrees and experience related to urban forestry. All personnel participating in tree maintenance should be International Society of Arboriculture (ISA) Certified Arborists (Appendix H). These positions would implement the Urban Forestry Management Plan and work in close coordination with the Parks and Recreation, Public Works, and Planning Departments. The duties of this staff would include:

- ◆ implementing the management plan and overseeing the health and development of the urban forest
- ◆ Conducting an inventory of city trees, their condition, and planting sites
- ◆ overseeing the removal of hazardous trees and all care of City trees including those on rights-of-way, in parks, and on other City properties
- ◆ establishing and carrying out a planting program including a Master Tree Planting Plan
- ◆ assisting with policy development
- ◆ responding to complaints and emergencies
- ◆ educating the public as to the benefits of the urban forest and assisting the FUFAB with organization of Arbor Day events
- ◆ working with developers, City personnel, and planners to protect existing trees and address storm-water treatment
- ◆ seeking state, federal, and private funds to match City monies

Annual budget needed for Frankfort's Urban Forestry Program

Operations

Priority maintenance (hazardous tree management)	\$ 15,000
Systematic pruning	\$ 5,000
Maintenance (watering, fertilization, insect control, etc.)	\$ 5,000
Planting (including site preparation)	\$ 15,000

Administration

Urban Forester*	\$ 25,000
Urban Forester Technician*	\$ 15,000
Office expense	\$ 2,000

(*position cost includes base salary plus a 20% fringe factor)

Capital

Computer maintenance/support	\$ 1,000
Field Equipment and maintenance	<u>\$ 5,000</u>

Total budget	\$ 88,000
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The proposed budget should be established expeditiously in order to effectuate the goals of the City Ordinance and to begin implementation of maintenance activities and other programs detailed in the Urban Forestry Management Plan.

It is critical that new staff positions be created and funded for this purpose. The current forest resources in City parks and on other City-owned properties can not be adequately maintained by existing staff. Additionally, the City is acquiring significant new public acreage in flood-prone and other areas. There is simply insufficient existing staff to manage the current situation.

In order for Frankfort's urban forests to be "protected, improved, and preserved" in accordance with the Ordinance, appropriate resources must be committed to meet the public goal.

From a cost-benefit perspective, the benefits to our river-valley community from an urban forestry program outweigh the modest program costs. Existing and future forest resources would be managed to avoid the potentially significant costs associated with liabilities stemming from hazard trees in our public spaces. Enhanced canopy cover and appropriate tree placement can be low-cost bioengineering strategies to supplement other flood mitigation and drainage strategies. Tree plantings enhance tourism and economic development, and can provide needed shade and aesthetic enhancement for the City's public housing and recreational areas. And volunteer programs to be coordinated by the new staff can lead to savings, and increased community pride, and public spirit.

**II. CARRY OUT A COMPREHENSIVE INVENTORY OF CITY TREES, THEIR
CONDITIONS, AND PLANTING SITES**

III. DEVELOP AND FUND A TREE MAINTENANCE PROGRAM

Implement Priority Tree Maintenance

Based on the results of the tree inventory, four types of priority maintenance have been identified:

1. Removal of hazardous trees;
2. Pruning of major deadwood and broken branches (safety pruning);
3. Pruning trees within rights of way, including sidewalks; and
4. Pruning to eliminate future development of hazard trees and to improve branch structure and increase tree longevity.

If not addressed, these conditions may expose the City to liability issues. Hazard tree surveys and prompt scheduling of the correction of any problems identified should be scheduled twice a year. Companies who employ International Society of Arboriculture Certified Arborists and that follow the ANSI Z-133 Safety Requirements for Tree Care Operations (Appendix N) should be contracted for this work or, city staff should receive this training. The City should verify whether persons/companies involved with this work have adequate insurance and should stipulate safety requirements.

Considering the high number of hazardous and declining trees found during the survey, funding for priority maintenance (removals and safety pruning) should be at least \$15,000 initially. The first years would concentrate more on removals. Later years could be weighted more toward safety pruning.

Establish a Routine Maintenance Program

Trees in the urban environment face a much harsher environment than trees in a forest. Urban trees face problems such as soil compaction and root restriction, lack of organic nutrients (leaf litter is removed), increased vulnerability to insect infestation and infection from diseases, air pollution, root severance, and periods of severe water deficits. For urban trees to survive and flourish in the urban forest, a number of maintenance procedures are sometimes required. These include:

- ◆ Mulching
- ◆ Watering
- ◆ Fertilization
- ◆ Insect and Disease Monitoring and Control (Appendix O)
- ◆ Cabling and/or Bracing
- ◆ Lightning Protection

One of the most critical maintenance tasks is watering newly planted trees (at least for the first 3 years). Mulching around young trees is also very important in order to avoid mower and weed-eater damage, prevent weed competition and soil compaction, and preserve moisture. The best tree planting program is pointless unless watering, mulching, and other necessary maintenance are carried out. The proposed Urban Forest budget includes \$2,500 annually for watering and mulching.

Another important maintenance task is fertilization of high visibility trees and other trees exhibiting symptoms of stress. The proposed Urban Forest budget includes \$1,000 annually for fertilization.

The Urban Forester or consultant should periodically monitor for outbreaks of tree insects or diseases and implement treatment. Cabling, bracing, and lightning protection should only be performed on high value or historic trees of special significance. An annual budget of \$1,500 is recommended for these tasks. In the event of a severe insect or disease problem, additional funds may be required.

At present, Frankfort is experiencing a major outbreak of Dutch elm disease, which, if left unchecked, could kill every American elm in the City. Several American elms are located in City parks, with the majority growing on private properties. A public awareness campaign needs to be initiated, with the cooperation of the Extension Service, City government, state government, and local cable TV and radio stations. This campaign should be developed by the urban forestry program and should be put into operation as soon as possible. The insect vectors of Dutch Elm Disease emerge from diseased trees as the elms leaf out. They feed on other elms and infect them with the disease. The first line of defense is the removal and destruction of diseased elms that contain thousands of harmful beetle vectors. Removal of these trees prevents the emergence of the beetle and decreases the rate of spread of the disease (Appendix G).

Implement a Systematic Tree Pruning Program

Systematic pruning is a standard urban forestry management practice used by many cities. Nationwide, according to a 1986 survey¹, 39 percent of all cities systematically prune their street trees. The City should adopt a systematic tree-pruning program to facilitate management, while increasing the value of the urban forest and extending the useful life of every tree pruned. Proper structural pruning can easily double the life span of a tree.

As the City develops a systematic tree pruning program, it will shift toward pro-active tree management rather than the current crisis management approach and will realize the following benefits:

¹Trends in Urban Forestry Management. 1988. (Urban Data Services Publication) Vol. 20, No. 1; Available from International City Management Association (ICMA), 1120 G Street NW, Washington, DC 20005.

- ◆ Decreased cost per tree pruned (up to 50%)
- ◆ Improved safety for residents
- ◆ Decreased liability for the City
- ◆ Less clearance problems (street, sidewalk, sign, and overhead wires)
- ◆ Reduced need for priority maintenance
- ◆ Increased property values (and more income from property taxes)
- ◆ Improved tree condition and value
- ◆ Reduced number of service requests
- ◆ Improved public image of City services

The systematic pruning program should include all street trees and trees at City service offices. Park trees should also be on a systematic pruning program, especially in higher use areas. The proposed Urban Forest budget includes \$5,000 annually for this purpose.

This work should only be performed by properly trained City personnel or ISA certified arborists in order to ensure quality pruning (Appendix H). All pruning should be performed according to the ANSI A-300 Standard Practices for Tree Care Operations (Appendix M).

The trees should be pruned on a minimum three-year cycle and high visibility trees being pruned annually. The Plant Board already performs pruning but its program can be improved. In many cases, personnel have performed stub cuts and pruned trees according to the distance to the powerline (rather than tree structure). And have created hazardous trees near powerlines. (Exhibit E). The pruning could be done much more efficiently and for less cost with a proper management program and adoption of modern directional pruning guidelines. (Appendix P).

Provide Guidelines On and Resolve Root Damage

Trees in urban areas often conflict with other parts of the City's infrastructure. Sidewalk and tree root conflicts are most easily prevented by proper tree planting procedures. Where conflict is unavoidable, sidewalks can be engineered to substantially withstand root damage. Proper forest management can prevent new problems from developing, however many problems currently exist.

Sidewalk problems caused by tree roots should be solved without removing the tree, if possible. Sidewalk renovation options (such as sidewalk relocation, sidewalk elevation, or removal of sidewalks) should be considered. Root pruning should be the last resort. There are limitations to the extent of root pruning that can be performed without seriously damaging the tree or creating a liability for the City. For this reason, an experienced arborist is best qualified to make these determinations.

Trenching and other construction practices can cause root damage. Appendix _Q-part 3_ provides guidance on Critical Rooting Distance and Appendix _Q-part 8_ provides the

minimum distance you can sever roots from a tree without causing it to become unstable. In some cases, tunneling under a tree may be utilized instead of trenching to limit damage.

IV. DEVELOP AND FUND A TREE PLANTING PROGRAM

Identify Sites for Planting

At present, no City-wide urban forestry planting program or budget exists. Some planting is done in City parks or other city jurisdictions (using departmentally budgeted funds) and a few trees may be planted as a result of various grants. A planting program is critically needed and should involve an inventory of planting sites and development of a systematic planting plan. Adequate planting sites should be searched for and located on a map and a plan should be drawn up for planting as funds become available.

There are many opportunities for right of way plantings throughout the City. A street tree planting policy is needed. There is much space for tree planting on some other city properties, especially in the parks and the flood-prone properties recently acquired by the City.

A budget of \$15,000 a year is proposed for tree planting on City properties; this would provide for roughly 60 trees of two-inch caliper. These trees would need to be matched to their prospective sites, according to the species and its requirements. A site inspection should be required for each planting site to determine the soil type, texture, pH, moisture content and degree of compaction. The tree species should then be selected according to the site characteristics and its growth potential. Trees well adapted to their site require less maintenance, grow faster, and are healthier than those growing on a poorly matched site. Examples of trees often planted on inappropriate sites are red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*) and pin oak (*Quercus palustris*), which are bottomland trees requiring substantial amounts of moisture. They should be planted on flood plains or sites with adequate water supply, not in a sidewalk cutout or area with a confined root space.

Develop and Implement a Master Tree Plan

Using information from the inventory recommended in this document, as well as from other sources, a Master Street Tree Plan should be developed within the next 2 years to assist the Urban Forester in implementing a City wide street tree planting program. The 1988 Downtown Tree Planting Master Plan was never formally adopted and is outdated. The Urban Forestry Advisory Board, with technical advise and coordination with the City staff, should establish an overall tree canopy coverage goal for Frankfort. A new plan should be recorded on City street maps and/or in a computer database.

Develop Policies for Tree Selection

Proper planting selections can prevent undesirable species (e.g., silver maple and ailanthus) growing on the right of way, and improper placement of trees (e.g., under wires, too close to curbs and sidewalks, blocking signs, etc.).

A tree selection procedure should be developed that considers the width of the planting strip, vertical clearance, long-term visibility and other site conditions.

Use of native trees should be strongly encouraged.

Other goals would be: (1) to maintain species diversity; (2) use trees that have been selected for winter hardiness; (3) prohibit the use of invasive exotic tree species; and (4) all trees should be planted according to the guidelines provided in the ISA publication Principles and Practice of Planting Trees and Shrubs (Appendix L) and Guidelines for Successful Urban Tree Planting (Appendix R). See also Appendices S, T. and U.

Establish a street tree policy and a public/private agreement for tree placement

As mentioned previously a street tree policy needs to be developed for the city. This policy needs to be in place before street tree planting occurs in the planting strip between the sidewalk and the curb, whether the planting is carried out by the City or private landowners.

In some instances, the City may wish to enter a contract with an adjacent property owner and plant City trees on private property. This could be accomplished with an agreement between the City and willing homeowners. Although the agreement is entirely voluntary, generally, once the owner assumes responsibilities for a tree, he or she is required to meet established maintenance standards provided by the City. Street trees may be planted on private property when space is too restricting on public property, for example, under power lines, and the tree would be planted nearby to serve the purpose of a street tree.

V. ESTABLISH A PUBLIC INFORMATION/EDUCATION PROGRAM

Provide Public Education Materials

Improving the urban forest cannot be accomplished unless the public understands the importance of trees and the care that is necessary to preserve them. The majority of the trees in an urban landscape are on private property. An educated public will insist that its own trees are properly cared for and will support the FFAB's and City's efforts to protect the community's trees. Public education is a key part of any urban forestry program.

Periodic stories in the newspaper or on the radio and cable TV should be placed throughout the year. The City or FFAB should take advantage of educational information made available from the International Society of Arboriculture, the Extension Service, the Internet and numerous other sources. Educational information can also be made available at parks, garden centers, expositions, and events. Seminars and demonstrations on tree pruning, planting, tree selection, and proper tree care could be offered throughout the year. A specific program for utility-pruned trees is needed. Teachers should be encouraged to include information about trees in their curriculum. Neighborhood associations and other groups should be encouraged to plant and care for trees.

Arbor Day should be the annual focal event for the public education program. This should be coordinated with other City departments, the Extension Service office, public utilities, schools, libraries, environmental and youth organizations, and other groups.

Information and training should also be made available to developers. Encouragement and possibly incentives should be provided to these companies to preserve more trees and increase the success of tree planting.

Establish a Historic/Memorial and Champion Tree Program

These programs would provide citizens opportunities to plant trees in memory of a special person or to commemorate a special event. Business partners could also sponsor events surrounding tree commemoration. The City would organize the plantings by registering the site, maintaining a map of these sites and providing the participants with a site certificate. Contributions would be used to purchase trees as well as support the urban forestry program.

Another possibility would be to develop guided tree walks in the City. These events focus on the importance of trees to our natural heritage.

Initiate a Volunteer Program

Special projects such as park cleanups, mulching, watering and pruning are suited to volunteer assistance. A strong volunteer program could be crucial to the success of the Urban Forestry Program.

VI IMPROVE AND ENFORCE ORDINANCES AND POLICIES

Provisions of the subdivision regulations and the landscape ordinance can be improved to better protect and enhance the urban forest. New provisions should be considered. Existing provisions need to receive increased enforcement.

The city also needs to develop policies for handling street trees, removal and replacement of trees, pruning, hazard assessment, and other tree related activities

Revise the Subdivision Regulations adopted in 1978

These items are identified for further discussion and action:

- a) 2.6.9 states that wooded areas and significant topographical features need to be designated on a preliminary plat. This needs to be enforced.
- b) 4.23.1 states that “due regard shall be shown for all natural features. This needs to be clarified and enforced.
- c) 5.1.17 states that preservable trees one-foot or more in diameter be shown on the preliminary plat. This should be enforced or possibly refined. “Preservable” should be changed to “significant” and “significant” should be defined. Significant trees could include historical trees.
- d) 5.2.2(a) states planting strips will be graded at not less than 2%. In meeting the grading requirements, the topsoil is usually removed, leaving nothing but subsoil in which to plant trees. The topsoil should be stockpiled and used to backfill the planting strip so trees will grow in it.
- e) 5.2.2(e) mentions retaining as many trees as can be reasonably utilized and that grading can be adjusted to minimize tree loss. It needs to state a percentage of trees to be saved, or some other criteria should be used. The words “reasonable” and “practicable” make this provision difficult to measure and enforce.
- f) Preliminary Plat – Check List. This needs to include trees and other natural features such as sinkholes and steep grades (over 15%).
- g) Final Plat – Check List. This needs to include trees to be preserved and other natural features.

Revise the Landscape Ordinance, 1988 – Article 7 – including Planting Manual

These items are identified for further discussion and action:

- a) Integrate Beechwood’s proposed revisions into the Landscape Ordinance (Appendix _I_) along with suggested updates from consulting arborist.
- b) Revise recommended plant lists A and B to include new lists of small, medium, and large trees. (Appendix _J_)
- c) Revise plant list F – Unacceptable plants.
- d) 7.06 Trees to be placed under or near overhead utility wires should be from list of small trees – mature height under 26 feet.
- e) 7.08.2a Plant materials shall conform to the American Standard for Nursery Stock ANSI Z60.1 1996. (Appendix K)

- f) 7.08.4 All landscaping materials shall be installed according to current recommended planting procedures as stated in Principals and Practices of Planting Trees and Shrubs, by Watson and Himelick. (Appendix L)
- g) 7.08.4 All tree pruning shall follow the American National Standard for Tree Care Operations – ANSI A300-1995, (Appendix M) or the most recent edition. When performing tree maintenance, safety is a major concern. In order to protect the tree workers and the public, the American National Standard for Tree Care Operations – Safety Requirements – ANSI Z133.1 – 1994, (Appendix N) shall be followed, including updated supplements.
- h) 7.09.3 The FFAB should have a representative on the Landscape Advisory Committee in order to have input in reviewing variance request and development plans.
- i) 7.10 Preservation of existing trees. The Plan should show methods used to preserve trees or a plan showing adequate tree protection.

The current ordinances are primarily for the purpose of buffering new development from other land uses. It is recommended that the City study an Ordinance that would encourage the preservation and planting of trees, and one that ensures maintenance of newly planted vegetation.

POSSIBLE PROJECTS THAT WILL BENEFIT FRANKFORT’S URBAN FOREST

Establish a substantial fundraising program for the Tree Board such as: corporate solicitations, grant applications, or special events such as 5-kilometer run, bicycle rally, golf tournament.

Establish a City nursery (some progress has been made in this area). Get trees for the nursery from the National Tree Trust, the Division of Forestry, native seed collection, or other low-cost or no-cost sources. Provide for nursery maintenance. Commercial nurseries often lack the variety of species needed to have a diverse urban forest. A City nursery could grow any needed species and the cost would be lower than commercial purchase.

Establish a City policy for minimizing undesirable trees and plants.

Consider working with the plant board to develop a tree replacement program to remove hazardous trees under power lines and replace them with more desirable trees that would not need pruning. Many electric companies have adopted such programs. In some cases, trees are removed under the utility lines and replacement trees located in adjacent lawns. Information on a tree replacement program is available from the Louisville Gas and Electric.

Study ways to establish or improve a vegetative buffer zone along the Kentucky River and its tributaries in the City.

Establish an intern program for students in forestry, landscape design, or related areas to work on the urban forestry program. Utilize students for data input and other computer work, and for urban forestry maintenance and other tasks.

Carry out a continuing training program for city employees, developers, and homeowners.

Consider ways to connect green spaces in the city to promote more stable environmental systems, wildlife habitat, and recreation.

Develop a consistent policy for tree planting and care and other urban forestry activities in city rights of way.

Work with the city on city development projects to assure urban forestry considerations are included.

Develop a library and computer store of urban forestry related information.

Work to realize some of the urban forestry related goals outlined in the 1994 Comprehensive Plan:

Encourage and promote the preservation, protection, and restoration of Frankfort's unique natural resources.

Identify and protect sensitive natural resource sites and unique special areas from the effects of incompatible development.

Develop design standards that will protect Frankfort's viewsheds, watersheds, steep slopes and corridors.

Encourage protection of surface water and groundwater aquifers and development that is sensitive to environmental hazards.

Protect and enhance the community's water supply through stormwater control techniques

Ensure that the Kentucky River is preserved, protected and restored as a community water source and for the enjoyment of residents and tourists.

Develop standards to prevent streambank deterioration and soil erosion for all new developments.

As land is cleared for flood protection measures, encourage land to be maintained in open space and passive recreation.

APPENDICES

- A. BENEFITS OF TREES - INTERNATIONAL SOCIETY OF ARBORICULTURE
- B. HOW TREES CAN SAVE ENERGY - TREE CITY USA BULLETIN
- C. MAP OF FOREST CANOPY COVER - CITY OF FRANKFORT
- D. FRANKFORT SUBDIVISION REGULATIONS
- E. CITY OF FRANKFORT LANDSCAPE ORDINANCE ARTICLE 7 & PLANTING MANUAL AND LANDSCAPE ORDINANCE GUIDELINES
- F. TREES AND DEVELOPMENT: A TECHNICAL GUIDE TO PRESERVATION OF TREES DURING LAND DEVELOPMENT
- G. DUTCH ELM DISEASE AND ITS CONTROL
- H. ISA ARBORIST CERTIFICATION
- I. LANDSCAPE ORDINANCE REVIEW BY BEECHWOOD
- J. REVISED TREE LISTS
- K. AMERICAN STANDARD FOR NURSERY STOCK - ANSI Z60.1 - 1996
- L. PRINCIPLES AND PRACTICE OF PLANTING TREES AND SHRUBS
- M. ANSI A300-1995 AMERICAN NATIONAL STANDARD FOR TREE CARE OPERATIONS - TREE, SHRUB, AND OTHER WOODY PLANT MAINTENANCE - STANDARD PRACTICES
- N. ANSI Z133.1-1994 AMERICAN NATIONAL STANDARD FOR TREE CARE OPERATIONS - PRUNING, TRIMMING, REPAIRING, MAINTAINING, AND REMOVING TREES AND CUTTING BRUSH - SAFETY REQUIREMENTS
- O. PLANT HEALTH CARE BROCHURE
- P. ECONOMICS OF UTILITY LATERAL TRIMMING
- Q. CONSTRUCTION DAMAGE ASSESSMENTS: TREES AND SITES
- R. GUIDELINES FOR SUCCESS IN URBAN TREE PLANTING
- S. JAMES URBAN ARTICLES - ROOM TO GROW , BRINGING ORDER TO THE TECHNICAL DYSFUNCTION WITHIN THE URBAN FOREST
- T. TREE PLANTING - DR. BONNIE APPLETON
- U. ARCHITECTURAL GRAPHIC STANDARDS - 1998 CUMMULATIVE SUPPLEMENT

